

Low Creep/Low Relaxation Materials for Deployable Structures

Completed Technology Project (2017 - 2019)



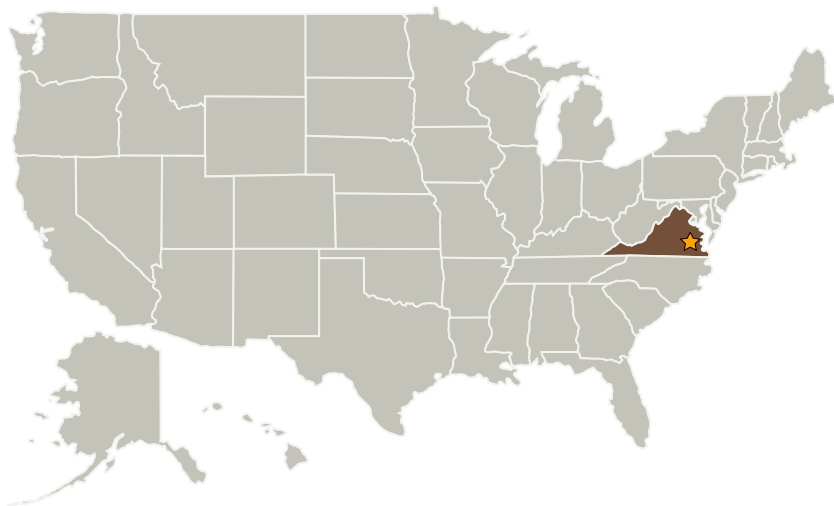
Project Introduction

Design of new, stiff molecular structures containing aromatic rings. Candidate polymer structures are aromatic polyimides synthesized from rigid monomers. Use of reactive functional groups to control cross-linking density, keeping a good balance between restriction of molecular rearrangement and material brittleness. Addition of second phase components to restrict large scale rearrangements of polymer molecules. #Characterization of the temperature-dependent creep and stress relaxation properties to predict life time creep behavior.

Anticipated Benefits

Potential for large space structures payload applications such as solar sails, solar arrays, antennas, payload booms, Moon/Mars habitats and planetary decelerators.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia
National Institute of Aerospace	Supporting Organization	Academia	Hampton, Virginia



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Primary U.S. Work Locations

Virginia

Project Transitions



October 2017: Project Start



September 2019: Closed out

Closeout Summary: Develop resins for novel low-creep and low-stress-relaxation polymer composites for inflatable and deployable space structures like solar sails. (Current-technology fiber reinforced polymer composite materials can cause dimensional instability due to materials' inherent viscoelastic behavior).

Project Website:

https://www.nasa.gov/directorates/spacetech/innovation_fund/index.html#.VC

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Center Innovation Fund: LaRC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Julie A Williams-byrd

Principal Investigator:

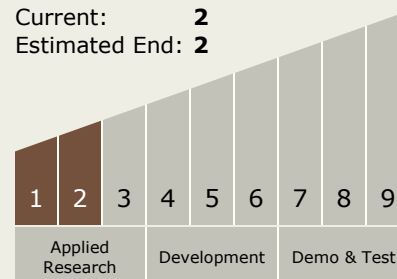
Jeffrey A Hinkley

Technology Maturity (TRL)

Start: **1**

Current: **2**

Estimated End: **2**



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Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.4 Advanced Propulsion
 - └ TX01.4.1 Solar Sails

Target Destinations

The Moon, Mars, Others Inside the Solar System